

**APPLICATION FOR A UNITED STATES PATENT**  
**UNITED STATES PATENT AND TRADEMARK OFFICE**

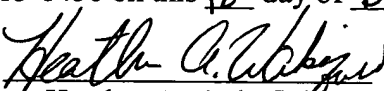
Title:           Anti-Pinch and Electrical Motor Protection Device

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By:

  
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## **FIELD OF INVENTION**

This invention relates to an anti-pinch and motor protection device. More specifically, the invention relates to a positive temperature coefficient (hereinafter referred to as PTC) circuit protector device used with an alternator device to not only  
5 release a potentially pinched object but to also extend the life of the motor.

## **BACKGROUND OF INVENTION**

In motor vehicles, motor driven devices, such as in windows and seat positioning, are becoming increasingly popular over standard manual devices. Consumers find it much easier and enjoyable to push a button to have the window go up and down or to  
10 move a seat into a desired position. Rolling windows down or positioning a seat manually is becoming increasingly obsolete. However, these and other motor driven devices like them have been known to become dangerous for users if a body part or some other article gets caught while the motor is activating movement. While an object is caught, there can be a lot of stress on the motors and they may burn out if they become  
15 too hot or even just shut off. If this happens, the body part or article caught is still pinched and cannot be released until the motor cools and is reset. This can result in serious damage or injury. The solution to that problem has been to use load sensing devices in line with a motor power output or combined current/speed sensors with sophisticated and expensive software plus motor thermal protection systems. Examples  
20 of such devices for motor driven windows include U.S. Patent Application Publication Nos. 2003/0151382 A1, 2003/0137265 A1, 2002/0190680 A1, and 2001/0048280. U.S. Patent Nos. 6,548, 979, 6,404, 158 and U.S. Patent Application Publication Nos. 2002/0121872 and 2002/0101210 solve this problem for more devices than just motor

driven windows. The devices in these applications solve the problem for door positioning, windows, sliding panels (such as a sunroof), seats, control petals, steering wheel, etc.

While the above listed inventions help move the technology for motor driven devices in motor vehicles forward, they are very costly and make cars more expensive for consumers. This invention allows consumers to keep their motor driven windows, seat, sliding panels, etc. while keeping costs down. This invention combines the anti-pinch and motor protection function by replacing the sophisticated and costly anti-pinch devices while still retaining circuit protection PTC features at the same cost.

## **SUMMARY OF INVENTION**

This invention relates to an anti-pinch and electrical motor protection device comprising at least one PTC circuit protector, a diode, and an electrical current. This invention will preferably have two PTC circuit protectors comprising one PTC circuit protector tuned to a low temperature and one PTC circuit protector tuned to a high temperature.

In cases where a body part or an article is caught and thereby putting stress on the motor, the motor will tend to overheat. Once the temperature becomes too high for the PTC circuit protector tuned to a low temperature, the electrical current is bypassed in an opposite direction through the diode until the PTC circuit protector tuned to a high temperature is tripped. This action allows for the reversal of the direction of the motor thereby releasing the pinched object and extends the life of the motor.

This invention can be used with any DC type motor.

## **DETAILED DESCRIPTION OF DRAWINGS**

FIG. 1 is a view of the circuit.

FIG. 2A is a view of the circuit in normal mode.

FIG. 2B is a view of the tripped circuit.

FIG. 2C is a view of the circuit bypassing through diode until the PTC circuit  
5 protector tuned to a high temperature is tripped.

FIG. 3 is a view of current direction allowed in ranges of temperature. When the temperature is below 125 degrees Celsius in preferred embodiment, current runs in both directions. No current runs above 150 degrees Celsius in the preferred embodiment.

FIG. 4 is an electrical diagram of connections.

10 FIG. 5 is a graph of system resistance versus temperature, which shows the increased motor protection capabilities.

#### **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

In its preferred embodiment, this invention will be used in motor driven windows, seat, roofs, or any other component of a motor vehicle that utilizes a DC motor. FIG. 2A  
15 shows the circuit in its normal mode. In its normal mode, seen in FIG. 2A, the electrical current 14 travels over the PTC circuit protector tuned to a lower temperature 8, generally around 125 degrees Celsius. The temperature the PTC circuit protector tuned to a low temperature 8 can be any appropriate temperature as long as there is a difference between the temperature of the PTC circuit protector tuned to a low temperature 8 and a  
20 PTC circuit protector tuned to a high temperature 10. When the motor is running as it should and there is nothing pinched under the device, the electrical current has no problem traveling across the PTC circuit protector tuned to a lower temperature 8. However, in motor driven windows, seats, roof, etc., there is always the risk that an

object, a body part, or article of clothing will get pinched. Once that happens, there is high stress on the motor (not shown) running that window, seat, or roof. That stress can result in the motor (not shown) malfunctioning or even cease to function. That can cause severe damage to the motor (not shown) and delay getting an object out of its pinched position, resulting in damage or injury.

In this preferred embodiment, if the motor driven device (not shown) pinches something within it and the motor (not shown) begins to overheat above the temperature that the PTC circuit protector tuned to a lower temperature 8 can handle, the circuit is tripped. Instead of the motor (not shown) simply shutting off until it cools enough to reset, instant reverse motion of the motor (not shown) is available by bypassing the tripped PTC circuit protector at a low temperature 8 through the diode 12 until the PTC circuit protector tuned at a high temperature 10 is tripped. This instant reverse motion allows for any object pinched to be released safely and without damage to the motor (not shown) and perhaps only minimal damage or injury to the pinched object because the motor cannot run back in the direction of pinching. Generally, in its preferred embodiment, the PTC circuit protector tuned to a high temperature 10 is tuned to a temperature around 150 degrees Celsius. The PTC circuit protectors can be tuned to any temperature, as there is a temperature difference between the PTC circuit protector tuned to a low temperature 8 and the PTC circuit protector tuned to a high temperature 10.

FIG. 5 depicts in graph form what happens as temperature and resistance increase. When the resistance on a motor is increased, the temperature also increases until the PTC circuit protector tuned to a lower temperature is tripped. At that point, reverse polarity PTC (PTC circuit protector tuned to a higher temperature 10) trips and allows the motor

to run at a higher temperature even though the resistance may be the same as it was at the lower temperature.

This invention is very important to any DC driven motors within a motor vehicle because of not only is safety and motor protection features, but also because it is a very  
5 easy way to keep down costs of a motor vehicle. This invention is a simplified way of meeting consumer demands for safety and meeting manufacturer's demands for motor protection without using costly software.

The above presents a description of the best mode contemplated for carrying out this invention. The claims should not be read as limited to the described order or  
10 elements unless stated to that effect. Therefore, all embodiments that come with the scope and spirit of the following claims and equivalents thereto are claimed as the invention.